E – 37

The Effect Of *REOG* Learning For Mathematical Analogic Ability From Junior State High School In Pacitan Regency

Khoirul Qudsiyah [1], Tika Dedy Prastyo [2]
[1.2] *STKIP PGRI Pacitan*
[1] azril.dito@gmail.com , [2] kuliah.didiet@gmail.com

Abstract

Student anxiety in mathematics learning is how all of their find a partner to solve their problems about mathematics. Mathematical analogic ability is one from many solution for students to help their deadlock if they are want to learning mathematics in individual condition. Aim from this research is to describe different of mathematical analogic ability between students using REOG learning and student using conventional learning, based on (a) all of students, (b) clever student category and (c) inferior student category. This research used experimental qualitative research methode using 148 subjects of study from population, it is held on even semester school year 2013/2014. Instrument data collecting technique used : 1) learning achievement test, 2) creativity questionnaire. Data analyzing technique used one way ANOVA with the help of SPSS Software. The results showed that there are differences in the average results analogy ability of students in each group. On average students proficient category in the experimental group was 50.98 greater than the average student proficient category in which the control group obtained a value of 42.60 and the average student in the experimental group weak category of 53.07 is greater than the average student category of weak control groups which obtained a value of 40.67.

1. Background

Feeling less confident as if to haunt students in learning, for most students would be happier if it is being studied and will find it difficult to ask and instantly get a clear answer as soon as possible. Very few students found who study independently the next trying to gather any information from a variety of problems ever solved before, in this case called an analogy. The analogy is talking about two different things, not the other one, but two different things were compared with each other [7]. In make comparisons, look for similarities and differences between the things being compared. If it only shows the comparison equation without seeing the difference, then timbulah analogy, ie equation (similarity) between two different things. Reasoning process needs to be developed in the study of mathematics. This is because the process of reasoning is an aspect / essential part of mathematical thinking.

Students attitudes toward mathematics can not be separated from student's math skills. Students who have weak math skills tend to be negative towards mathematics, otherwise students who have good mathematical skills tend to be positive about mathematics. Students who have a positive attitude towards mathematics tend to have good mathematical skills. This is possible because students learn mathematics is not under compulsion, but it is out of necessity. While students who have good mathematical skills tend to be successful in life. So it is possible that students have a positive attitude towards mathematics tend to be successful in life. This fact is supported by Begle [2] who found that the average student tends to be neutral towards mathematics. Begle further said that when students were asked about the subjects taught in school, so if there mid sorted math. This gives a hint that disliked math students.

One of the math skills that are critical to student success is the ability of reasoning. This is because the math and reasoning are two things that can not be separated as understood through mathematical reasoning, while reasoning is understood

and practiced through the study of mathematics. This suggests that the ability of reasoning plays an important role in student success. Students who have good reasoning skills are expected to have good math learning achievement anyway.

Low ability students' mathematical reasoning adversely affects the achievement of learning math. This is consistent with the findings Wahyudin [11] in his research that found that one of the tendencies that led to a number of students failed to master the fine points of discussion in mathematics due to lack of students to use logical reasoning in mathematical problem solving or given. Rif'at research results [10] also showed weakness seen on the mathematical skills of students performance in reasoning. For example, errors in the completion of a math problem caused by incorrect use of deductive logic.

Matz [5] also suggested that the mistakes made by high school students in solving math problems due to lack of the basic rules of mathematical reasoning. While Vinner *et al.* [10] suggests that the error metematika students in understanding the concept of due process inaccurate generalization.

Some of the above findings indicate that student's reasoning abilities, especially the ability of students' mathematical analogy is still low. This was confirmed by the results of research conducted by Priatna [5]. Priatna found that the quality of reasoning (analogy and generalization) junior high school students' mathematics scores are low because only 49% of the ideal score.

If we observe carefully, the poor ability of students' mathematical analogy and not his favorite math by students, can not be separated from the learning activities conducted in the classroom. In lessons, students should be given a very wide opportunity to explore and discover their own mathematical concepts with a lot of math involved in the learning process that takes place.

A teacher must select and use strategies, approaches and methods are fun for the students, many methods that actively involve students in learning, both mentally, physically and socially. This requires a new learning strategies that empower students *(student centered).* A learning strategy that does not require students to memorize facts but a strategy that encourages students to construct knowledge of their own minds.

An alternative to the expected learning encourages students to be more active and more able to think creatively in solving mathematical problems is REOG models. REOG is designing a model of learning which is an acronym rationalize (*rasionalkan*), express (*ekspresikan*), organize (*organisasikan*), and *gayakan* (practice). REOG learning model emphasizes learning awareness of the meaning of the material being studied. The existence of stages or steps according to the design in the REOG words, teachers can foster creativity freely adjust the class materials management, learning environment, student characteristics, and learning facilities are available, as well as take advantage of interactive media such as interactive CD. Good classroom management with an alternative implementation model of REOG expected to increase mathematical concepts and student learning outcomes.

Learning mathematical models REOG give opportunity to the students to freely learn math work activity, students are given the opportunity to develop learning strategies individually and interact and negotiate with other students and with teachers. Through such activities enabled students do not feel pressured, do not worry, his confidence appeared and motivated to learn mathematics. It is possible a positive attitude towards mathematics students will grow. This is important, because a positive attitude toward mathematics correlated positively with math learning outcomes.

In addition to the presentation of the material models, learning outcomes and student attitudes towards mathematics is tied to students' prior knowledge, which in this

study were classified into groups of good and weak students in class. Basic classification of students is based on the results of the previous study mathematics (daily tests, midterm and end of semester), and the classification is done by the class teacher. This can be done because mathematics is a science that is structured so that there is a link between a mathematical topics with other mathematical topics. In addition, student mastery of specific mathematical topics will require student mastery of math topics before. It is therefore thought to be the result of previous study mathematics associated with subsequent learning outcomes. This is consistent with the findings Begle [2] through his research that one of the best predictors for mathematics learning outcomes are the result of previous study mathematics. Further it is said that the role of other cognitive variables were not for the variable results of the previous study.

2. Problem Formulation

Is mathematical analogy ability students who received mathematics instruction REOG models, significantly *better* than students who received conventional learning viewed from (a) the whole student, (b) a group of students are good at and (c) group of weak students?

3. Research Objectives

Assessing differences in the ability of mathematical analogy between the groups of students who use the method of *discovery* with students using conventional learning viewed from (a) the whole student, (b) a group of students are good at and (c) group of weak students.

4. Theory Study

Understanding Learning According to Constructivism Flow

Education is a universal activity in human life. Wherever and whenever this world will surely find the name of learning or education. Constructivists as a concept that many talk about learning, is expected to make the intellectual foundation for formulating and analyzing problems in the world struggle learning education [12].

Understand the constructivist theory of learning as a process of formation (construction) of knowledge by the learning itself [6]. Because knowledge is in a person who is aware. Knowledge can not be moved away from the brain of a teacher to the learner but the learner must be able to interpret what has been taught by the construction that has been built previously. The role of the teacher to provide an atmosphere in which the students design and direct the learning activities so that students can apply their knowledge.

According Lorsbach and Tobin [6] argues that knowledge can not simply be moved from one brain to another. Students who have to interpret what has been taught by the knowledge that has been built before, with things like this will encourage students to be more creative and active in the learning process.

The constructivist learning process rather than as the acquisition of information that goes in one direction from the outside into self-learners but rather the provision of meaning by the learners to experience. Learners must be actively engaged, active thinking, developing the concept of the things that will be learned, but the most decisive realization of good learning is the intention of learning from the learners themselves due to no good intentions, the learners will be difficult to accept what given by the teacher.

It can be concluded that according to the flow of constructivist learning is a learning process which will encourage students to be more creative and active in the learning process, build knowledge, which is based on its cognitive structure. Teachers act more as a facilitator and mediator of learning. The emphasis on learning and teaching more focused on the success of the students organize their thoughts.

Ability analogy

Marrison explained that children's development of logical reasoning allows them to see the correspondence and make inferences about relational phenomena similar in various conditions [3]. Skills is influential in increasing their capacity to transfer learning and abstraction scheme, two important aspects of children's learning and cognitive development. Develop linkages with mathematics with everyday life students are expected to understand mathematics as a whole and can be used to solve problems related to mathematics.

Mosing has been proved that the close relationship between analogical reasoning (reasoning relational process that involves mapping similarities between the concepts that otherwise noted) and categorical reasoning (the ability to process and recognize the categorical relationship between words or objects), the statement emphasized that analogical reasoning is collection of information that previously had been obtained then compiled to be used as a comparison to the problems that are faced in this case with respect to mathematics [4].

Analogy allows students to apply the similarity between the mathematical relationship to help understand new problems or concepts through contributing to the ability of the air component of the mathematics intact [1]. Learning by analogy usually involves finding a set of systematic correspondence (mapping) between the source and the target analog known that newer. Ability analogy allows students to explore a wider bermatematikanya capabilities through activities compare, analyze and conclude math problems.

Lawson [9] reveals analogies in teaching advantages, among others: (1) can help students acquire new knowledge by linking or comparing the analogy of knowledge of the students; (2) the association will help integrate the knowledge structures are organized into a separate order cognitive structure intact. With more organizations will facilitate the whole process of re-disclosure of new knowledge; (3) can dimanfatkan in tackling one concept. In the present study the ability of the analogy is the students' ability to find a connection object never previously understood with mathematics study objects that are being and will be studied.

5. Frame of mind

Constructivism learning paradigm encourages players to explore teaching and learning activities broadest expression of knowledge transfer activities *(transfer of knowledge)* that occurs in a two-way learning process. Creativity of each offender is required to be raised to enable the two-way discussion that resulted in the interaction between teachers and learners work well. Learners as the main actor in the learning activities is an object that is not empty, as objects that have had prior knowledge of students or learners should not be regarded as empty bottles to be filled with knowledge. Mathematical analogy process is an activity that should be raised by the students to learn mathematics more easily understood.

REOG learning model to accommodate all the learning activities, so that an alternative solution-REOG for learning problems at this time. REOG provide flexibility to explore the learning process in accordance with the constructivist view and provide space for the widest possible analogies for students to process knowledge and encourage the creativity of teachers in managing learning.

6. The research hypothesis

Mathematical analogy ability students who received mathematics instruction REOG models, significantly *better* than students who received conventional learning viewed from (a) the whole student, (b) a group of students are good at and (c) group of weak students.

7. Research Methods

The type and design of the study

The method used in this study is the experimental method. Experimental research can be defined as a research that seeks to uncover the relationship between two or more variables. Experimental studies also can be used to find the effect of a variable to another variable.

This study involves three variables, namely the independent variable, dependent variable and the control variables. Learning mathematics and learning REOG conventional models as independent variables, mathematical analogy ability of students as the dependent variable. Then the clever ability students and low ability students as a control variable. Methods of experiments conducted in this research by providing treatment of the subject of study of the use of different learning models. Learning mathematical models is given to students REOG experimental group, while the conventional teaching given to the control group students.

This study used a 2 x 2 factorial models, where 2 is the number of the learning factor REOG and conventional learning models, and the next 2 are many factors analogy mathematical ability of students classified into good and poor students. While the design used in this study is *"factorial design"*, that takes into account the presence of the control variables that affect treatment (independent variable) on the outcome (dependent variable).

Population Research

Population is the subject of research. Population is a generalization region consisting of: object / subject mempuyai certain qualities and characteristics that set research and then drawn conclusions [8]. The population in this study were students of SMP Pacitan East Java.

Study Sample

The sample is part of the number and characteristics of the population [8]. Sampling was carried out in this study using purposive sampling technique (random sampling aims). Technique of purposive sampling is a sampling technique deliberately with particular consideration [8]. The sample of this study were students of class VIII SMP Pacitan.

The samples in this study were selected from the schools included in the classification of schools being. Reasons for not choosing a school with good classification as a research sample because students from the school of this kind tend to be good learning results and the good it can happen not as a result of good lessons. Similarly samples in this study were not selected from schools with lower classification because students from schools of this kind belajanya results will tend to be low and low that happens due to lack of good learning is not performed [2]. Criteria for good schools, medium and low based on the ranking of schools that made Pacitan district education offices.

The study sample was obtained by the following steps: *First*, do grouping schools are classified as good, moderate and low. This grouping is done based on the data obtained from the district education office Pacitan. *Secondly*, choose one of the schools were over-sampled group research. *Thirdly*, from the schools that have been later selected two classes that have a mean difference of learning outcomes are not significantly different. *Fourth*, students classify good and weak students in each class.

The results of the analysis of the description of the national exam mathematics courses Pacitan data shows that, (1) the acquisition of the average value of all secondary schools was 4.45, (2) the calculation srandar deviation of 0.85, (3) the maximum value achieved by all students was 7.80 and, (4) a minimum value of 3.43. Referring to the

description of the data is selected schools used research include 2 Donorojo SMP, SMP Negeri 2 Pringkuku and SMP Negeri 1 Arjosari. Selection of group classes each school selected in the two study groups namely experimental class (learning Roeg) and a control class (the conventional learning) of the parallel class VIII class A and class B parallel, where A is a parallel class of experimental group (learning Roeg) and class B is a parallel control group (conventional learning). Determination of the experimental and control groups performed random selection and aims *(purposive random sampling).*

Research Instrument

In an effort to get the data and complete information regarding the matters to be examined in this study, it was made a set of instruments. This study used two instruments, namely a circle about the test material, and questionnaires.

Test

The tests used are analogy and generalization ability test which consists of test mathematical beginning *(pretest)* and final test *(posttest).* The tests were given to each experimental class and control class good questions for *the pretest* and *posttest* equivalent / relatively equal. Initial tests conducted to determine the ability of the students at the beginning of the experimental class and the control class and is used as a benchmark for improvement of learning achievement before getting learning methods will be applied, while the final test was conducted to determine the acquisition of learning outcomes and whether there is a significant pengauh after getting learning with learning methods will be applied. Thus, administration of the test in this study aims to determine the effect of differences in learning outcomes between students who received mathematics learning with models and conventional REOG mathematical analogy to the ability of the student.

Questionnaire

The questionnaire used was a questionnaire students' attitudes toward mathematics. This questionnaire aims to reveal students' attitudes toward learning mathematics after obtaining. Attitude questionnaire used consists of 5 components, namely: (a) the self-confidence to learn mathematics, (b) mathematics anxiety, (c) the usefulness of mathematics, (d) motivation in learning mathematics, and (e) the role of the teacher.

Lattice structured questionnaire based on the five components, each component has positive and negative statement. This attitude questionnaire using *a Likert* scale form which has five answer choices, ie strongly agree (SS), agree (S), neutral or hesitant or do not know (N), disagree (D) and strongly disagree (STS).

Data Analysis Techniques

The research data collected in the experimental class and grouped control class, then performed the ANOVA test, to determine the effect of each independent variable on the dependent variable and the *t* test was used analyzes performed at a significance level of 5%.

8. Results

Results

Data prior to the study

National test data is basic data that is used as a reference for determining the location of the research, by classifying schools in category tnggi, medium and low. Average achieved national test scores as mathematics dikomparasikan standard deviation obtained grades throughout the district in question classification. Where these values, among others, the value of at least 3.43; maximum value of 7.80; average value of 4.45 and a standard deviation of 0.85. The average value of mathematics courses

based on the data of national examinations in each school classification in the study showed a moderate level as indicated average rating SMP N 2 Donorojo 5.17; SMP N 2 Pringkuku 4.64; SMPN 1 Arjosari of 4.40.

Data after study

Description of questionnaire data and test scores

Class research groups that have been determined then performed the classification of students in categories (1) smart and (2) weak based on questionnaire data collected at each of the experimental and control groups. The data results of a questionnaire scoring has been described in a statistical description, where the value of the control class questionnaire scores showed maxima at 191, with a score of at least 135, an average of 166.325 with a standard deviation of 9.852. Experimental class didatakan maximum score 189, a minimum score of 125, an average of 163.627, while the standard deviation of 14,219

Distribution of clever student data in the experimental group of 36 students and the number of students who are included in the category of weak total of 32 students, 35 students in the control group and 45 in the weaker categories of students included in the category of good. Analysis of the data in the study using factor analysis test (ANOVA) one way *(one-way ANOVA)* with the help of statistical application *SPSS for Windows* version 16.0. The data were obtained from the work about the analogy, which is referred to as a data acquisition control class scores on each of a maximum score of 70.13, a minimum score of 15.39, an average of 41.75 and a standard deviation of 15.00. In the experimental class obtained the maximum score of 90.90, a minimum score of 16.88, an average of 52.02 and a standard deviation of 18.79.

Description of data normality and homogeneity

Kolmogorov-Smirnov (KS) indicates the value of $p > 0.05$, where the p value of 0.190 is obtained in the experimental group students' clever category. The calculation can be interpreted that the group of students in the experimental class clever normal distribution because the value of $p > 0.05$ (Field, 2009, h.545). Similar results were obtained no results in the calculation of normality weak student group which gained p value of 0.128. Normality of data on the control class, shows that the data are normally distributed p values based on calculations using Kolmogorov-Smirnov test where p category clever of 0.200 and a weak category worth 0,200. Homogeneity of the data needed to determine whether the data has a variance difference or not, by using the method of *Levene's test* with the help of SPSS 16.0menunjukkan *p-value* calculation results on Levene's test where the obtained values $p > 0.05$ (Field, 2009, h.150), where *Levene's Statistic* value of 2.084 it can be concluded that the category (1) smart and (2) weak no difference in variance of the data group and the experimental class and the control class data can be maintained. Referring to the results of the homogeneity test is valid if the data are used to examine the relationship between variables in the study.

Results of analysis of variance

Referring to the results of homogeneity test for each class that shows the calculation of the value of above 0.05 *(p-value*> 0.05), the interpretation phase can use the data interpretation of the ANOVA table in the output of statistical calculations (Field, 2009, h.388), so that the displayed data one way ANOVA of SPSS 16.0 calculations, the value of P *(P-Value)* of 0.004, which means the value is under 0.05 which conclusions obtained are no significant differences between mean values of two groups based on the mathematical analogy clever creativity and the weak.

9. Conclusion

Average overall analogy test results showed differences from each experimental group and the control class class, it can be shown the average value of the experimental class at 74.362 and the average value of control class is 73.534. In detail, will be discussed hypothesis testing results using descriptive data calculation results.

The hypothesis that the ability to perform mathematical analogy of students who received REOG mathematics learning models, significantly better than students who received conventional learning viewed from (a) the whole student, (b) a group of students are good at and (c) weak student groups, research shows that the average of experimental group is better than the control group, in which: (a) the overall average of 52.02 experimental group of students is larger than the overall average of the control group where the students obtained a value of 41.75; (b) Average clever category students in the experimental group was 50.98 greater than the average student category of intelligent control group which obtained a value of 42.60 (c) average category of weak students in the experimental group at 53, 07 is greater than the average student is weak category in which the control group obtained a value of 40.67

REFERENCES

[1] Amir-Mofidi, S., Amiripour, P., & Bijan-zadeh, M. (2012). Instruction of mathematical concepts through analogical reasoning skills. Indian Journal of Science and Technology, 5(6), 2916-2922. Retrieved from http://search.proquest.com/docview/1022503475?accountid=62692

[2] Darhim. (2004). *Pengaruh Pembelajaran Matematika Kontekstual terhadap Hasil belajar Matematika Siswa Sekolah Dasar*. Disertasi UPI. Bandung : Tidak diterbitkan.

[3] Morrison, R., Doumas, L., & Richland, L. (2011). A computational account of children's analogical reasoning: balancing inhibitory control in working memory and relational representation. Developmental Science, 14(3), 516-529. doi:10.1111/j.1467-7687.2010.00999.x

[4] Mosing, M., Mellanby, J., Martin, N., & Wright, M. (2012). Genetic and environmental influences on analogical and categorical verbal and spatial reasoning in 12-year old twins. Behavior Genetics, 42(5), 722-731. doi:10.1007/s10519-012-9540-3

[5] Priatna, N. (2003). *Kemampuan Penalaran dan Pemahaman Matematika Siswa Kelas 3 SLTP di Kota Bandung.* Disertasi UPI Bandung: Tidak diterbitkan.

[6] Siregar, Eveline & Nara, Hartini. 2010. *Teori Belajar dan Pembelajaran.* Bogor: Ghalia Indonesia.

[7] Soekadijo, G.R. (1991). *Logika Dasar Tradisional, Simbolik dan Induktif*. Jakarta: Gramedia

[8] Sugiyono. (2008). *Metode Penelitian Pendidikan*. Bandung : CV. Alfabeta.

[9] Suriadi. (2006). *Pembelajaran dengan Pendekatan Discovery yang Menekankan Aspek Analogi Untuk Menigkatkan Pemahaman Matematik dan Kemampuan Berfikir Kritis Siswa SMA*. Tesis UPI Bandung: Tidak diterbitkan.

[10] Suzana, Y. (2003). *Meningkatkan Kemampuan Pemahaman dan Penalaran Matematika Siswa Sekolah Menengah Umum melalui Pembelajaran dengan Pendekatan Kognitif.* Tesis UPI Bandung: tidak diterbitkan.

[11] Wahyudin. (1999). *Kemampuan Guru Matematika, Calon Guru Matematika, dan Siswa dalam Pelajaran Matematika*. Laporan penelitian IKIP Bandung. Bandung: Tidak diterbitkan.

[12] Yatim Riyanto. 2009. *Paradigma Baru Pembelajaran.* Jakarta: Kencana Prenada Media Group.